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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/516,457	12/03/2004	Michel Puech	Q84448	2874

23373 7590 04/05/2007

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EXAMINER	
NG, JAMES WAI HEUNG	
ART.UNIT	PAPER NUMBER
1763	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/05/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/516,457	PUECH, MICHEL	
	Examiner	Art Unit	
	James Ng	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 December 2004 and 29 January 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) *17 and 18* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 December 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *12/03/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Claims 1-16 in the reply filed on January 29, 2007 is acknowledged.

2. Claims 17 and 18 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 1/29/2007.

Drawings

3. The drawings are objected to under 37 CFR 1.83(a) because they fail to show a conductive grid downstream from the substrate support means as described in the specification. In Figure 2, the conductive grid is shown adjacent or midstream to the substrate support means. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either

"Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5. **Claim 14 is rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the enablement requirement. The claim contains subject matter that was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 14 states "the inside surface of the heater liner is structured so as to present a low radiation emission coefficient." No description as to how the liner is so structured is found.

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. **Claims 1, 2, 5, 6, 7, 9, 11, 12 and 14 are rejected under 35 U.S.C. 112, second paragraph,** as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The terms "appropriate" in claims 1 and 2, and "suitable" in claim 12, and the term "small" in claims 5 and 6 are relative terms that render the claims indefinite. The terms are not defined by the claims, the specification does not provide a standard for ascertaining the requisite

degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Claims 5 and 7 recite the limitation "fastening points." It is unclear whether the limitation refers to locations or members.

Claim 7 also recites the limitation "thermally insulating structure," but it is unclear whether "structure" means shape or material.

For the purpose of examination, the limitations of claims 5 and 7 are interpreted as follows:

In claim 5, the fastening points are assumed to be screws or hooks.

In claim 7, the term structure is assumed to be a material.

Regarding claims 9 and 11, the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim 10 recites the limitation "thermocoaxial type." Without further explanation in the Specification, it is unclear what the limitation is describing. For the purpose of examination, this limitation is assumed to be describing a coaxial cable shaped heating element.

Claim 14 recites the term "structured" without pointing out what the structure of the liner is. Could this be some sort of treatment or coating on the liner, or some special shape? For the purpose of examination, the termed "structured" is assumed to be a form of treatment.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. Claims 1-3, 6, 9, 12, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bosch et al. (US 6506254 B1) in view of Wang et al. (US 2003/0188685 A1).

Bosch teaches a plasma processing apparatus comprising:

i. A reaction chamber (2) surrounded by a leakproof wall (outer perimeter of chamber), containing substrate support means (8), and communicating with a plasma source (18), is characterized in that it further comprises a heater liner (20) lining all or part of the leakproof wall (outer perimeter of chamber) of the reaction chamber (2) in non-leakproof manner, and an intermediate thermal insulation space (area between 26 and wall) provided between the heater liner (20) and the leakproof wall (outer perimeter of chamber) of the reaction chamber (2) (See Fig. 6, Col. 10, lines 1-65).

Support for the "substrate support means" limitation of claim 1 is found in lines 6-9, page 12. Specifically, the specification teaches "particular means for holding a substrate 23 on the substrate support means 3: these particular means are electrostatic electrodes 3a for attracting the substrate." Bosch teaches an electrostatic chuck (8). As such, Bosch teaches an equivalent apparatus that performs the function of attracting the

substrate by electrostatic attraction. As a result, Bosch's prior art elements of electrostatic chuck (8) for attracting the substrate perform the identical function of "means for holding a substrate 23 on the substrate support means 3: these particular means are electrostatic electrodes 3a for attracting the substrate" in substantially the same way, and produces substantially the same results as the corresponding elements disclosed in the specification (MPEP 2183) – **in claim 1**.

ii. The intermediate space between the heater liner (20) and the leakproof wall (outer perimeter of 2) of the reaction chamber (2) communicate with the central space of the reaction chamber (2) via an annular space (area between 26 and 2) of small thickness (See Fig. 6) – **claim 6**.

iii. The heater liner (20) is thermally coupled to heater means (28) such as electrical resistances (Col. 10, line 57) suitable for connection to an external source of electrical energy (Fig. 6, Col. 10, lines 24-58).

Support for the "heater means" limitation of claim 9 is found in lines 2-5, page 7. Specifically, the specification teaches "the heater liner is thermally coupled to heater means such as electrical resistances suitable for connection to an external source of electrical energy." Bosch teaches a heater (28) powered by electrical leads, or radiant heating can also be used. As such, Bosch teaches an equivalent apparatus that performs the function of heating a liner. As a result, Bosch's prior art element of a heater (28) for heating a liner performs the identical function of the applicant's hearer in substantially the same way, and produces substantially the same results as the corresponding elements disclosed in the specification (MPEP 2183) – **claim 9**.

iv. Downstream (see above drawing objection) from the substrate support means (8) the reaction chamber (2) is limited by a conductive grid (screen, 22) in thermal contact with the heater liner (20) (Fig. 6, Col. 10, 24-65) – **claim 15**.

v. The substrate support means (8) comprise electrostatic electrodes (electrostatic chuck) for attracting the substrate (6) (Col. 10, lines 6-10) – **claim 16**.

Bosch does not teach:

i. A liner made of metal or alloy – **in claim 1.**

ii. A reactor according to claim 1, characterized in that the appropriate metal or alloy is selected from metals and alloys that firstly do not react with the fluorine-containing etching gas or the passivation gas to form volatile compounds, and secondly do not emit contaminating atoms under the effect of plasma bombardment – **as claimed in claim 2**.

iii. A reactor according to claim 2, characterized in that the appropriate metal is aluminum or titanium – **as claimed in claim 3**.

iv. A reactor according to claim 1, characterized in that the heater liner is associated with temperature-regulator means for regulating its temperature in a suitable range of temperature values – **as claimed in claim 12**.

Wang teaches a plasma processing apparatus comprising:

i. A chamber liner (shields, 150) made of aluminum or titanium (Figs. 1a, 1b, Para. 24) – **in claims 1, 2, and 3.**

ii. A process monitoring system (not shown, including a temperature sensing device, Para. 53-54) used to detect and monitor process conditions continuously during an operation of the processing chamber, along with a controller (480) to control operation of the chamber by transmitting and receiving electrical signals to and from the various chamber components and systems. The controller (480) then could function as temperature-regulator means for regulating the liner's (150) temperature (See Fig. 1a, Para. 53 and 54).

Support for the "temperature-regulator means" limitation of claim 12 is found in lines 17-18, page 11. Specifically, the specification teaches "temperature regulator means comprising a control device 19 which receives information concerning the temperature of the heater liner 14 as picked up by a temperature sensor 18." Wang teaches a process monitoring system (not shown, Para. 53-54) comprising one or more detectors (not shown, Para. 53-54) such as a temperature sensing device (not shown, Para. 53-54), and a controller (480, Fig. 1a, Para. 54) controls operation of the chamber by transmitting and receiving electrical signals to and from the various chamber components and systems. As such, Wang teaches an equivalent apparatus that performs the function of "a control device which receives information concerning the temperature of the heater liner as picked up by a temperature sensor." As a result, Wang's prior art elements of a temperature sensing device and a controller for monitoring and controlling components of the apparatus perform the identical function of a control device which receives information concerning the temperature of the heater liner as picked up by a temperature

sensor in substantially the same way, and produces substantially the same results as the corresponding elements disclosed in the specification (MPEP 2183) – **claim 12**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Wang's controller and temperature sensing device, and for Bosch to use metallic material for Bosch's liner as taught by Wang.

Motivation to add Wang's controller and temperature sensing device is to automate process monitoring and control resulting in less downtime or faster production, which is a benefit in the highly competitive electronic industry as taught by Wang (Para. 3, 53, 54). Further, it has been held that automation is obvious. (In re Venner, 262 F.2d 91, 95, 120 USPQ 193, 194 (CCPA 1958); MPEP 2144.04)

Motivation for Bosch to use metallic material for Bosch's liner as taught by Wang is that ceramic material tends to be brittle and non-ductile as taught by Wang (Para. 46).

10. **Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bosch et al. (US 6506254 B1) in view of Wang et al. (US 2003/0188685 A1) as applied to claim 1 above, and further in view of Inazawa et al (US 5595627), Miller (US 4439463) and Frankel et al. (US 6019848)**. Bosch and Wang are discussed above.

Wang further teaches:

i. Bias means (240) for biasing the substrate support means (160) in order to control bombardment by particles coming from the plasma (Para. 51) – **in Claim 4**.

Support for the "bias means" limitation of claim 4 is found in lines 24-29, page 9. Specifically, the specification teaches, "substrate support means 3 are biased by an RF

generator 11." Wang teaches an electrode power supply (240) for proving an RF bias voltage is connected to the substrate support (160). As such, Wang teaches an equivalent apparatus that performs the function of biasing the substrate support. As a result, Wang's prior art element of electrode power supply for biasing the substrate support perform the identical function of biasing the substrate support means in substantially the same way, and produces substantially the same results as the corresponding elements disclosed in the specification (MPEP 2183).

Bosch and Wang do not teach:

i. A reactor according to claim 1, characterized in that it further comprises: an etching gas source, and means for controlling the etching flow rate to govern the introduction of etching gas into the plasma source; a passivation gas source, and means for controlling the passivation flow rate for governing the introduction of passivation gas into the plasma source; and a control device adapted to cause the etching gas flow rate control means and the passivation gas flow rate control means to operate in alternation – **in claim 4**.

Inazawa teaches a plasma etching apparatus comprising:

i. An etching gas source (70), and a mass flow controller (64) and valve (58) for controlling the etching flow rate to govern the introduction of etching gas into the plasma source; a passivation gas source (68), and a mass flow controller (62) and valve (56) for controlling the passivation flow rate for governing the introduction of passivation gas into the plasma source; and a control device (78) adapted to control the flow rates of the etching gas and the passivation gas (See Fig. 1, Col. 5, lines 1-13) – **in claim 4**.

Miller teaches a plasma processing apparatus comprising:

i. A solenoid valve (98) for controlling gas flow rate into the reactor (18) (See Fig. 3, Col. 6, lines 61-68) – **in claim 4**.

Support for the "means for controlling" limitation of claim 4 is found in lines 11-16, page 9. Specifically, the specification teaches, "etching gas and etching flow rate control means 9b such as a solenoid valve" and "means 9b for controlling passivation flow rate, e.g. a solenoid valve." Miller teaches a solenoid valve as part of a flow control system. As such, Miller teaches an equivalent apparatus that performs the function of controlling gas flow rate. As a result, Miller's prior art element of solenoid valve for controlling gas flow rate perform the identical function of controlling gas flow rate in substantially the same way, and produces substantially the same results as the corresponding elements disclosed in the specification (MPEP 2183).

Frankel teaches a plasma processing apparatus comprising:

i. A control device (processor, 50) adapted to select one of two sources (43, 47) of gases to be sent to the processing chamber (15) in alternation (See Fig. 1A-1E, Col 13, lines 18-27) – **in claim 4**

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Wang's bias means to Bosch's substrate support means, and to add Inazawa's gas sources and control to Bosch's apparatus.

Motivation to add Wang's bias means to Bosch's substrate support means is to allow etching of the substrate by energizing and accelerating the plasma ions toward the substrate as taught by Wang (Para. 51).

Motivation to add Inazawa's gas sources and control is the ability to produce higher quality FETs as taught by Inazawa (Col. 1, lines 31-36).

It would also have been obvious to one of ordinary skill in the art at the time the invention was made to replace Inazawa's valve with Miller's solenoid valve, and add Frankel's control device programming to Inazawa's control device.

Motivation to replace Inazawa's valve with Miller's solenoid valve is to permit gaseous material to pass into the first chamber at a controlled rate as taught by Miller (Col. 7, line 31-33).

Motivation to add Frankel's control device programming to Inazawa's control device is to allow multiple process steps to be performed in situ in the same chamber to reduce total processing time as taught by Frankel (in Abstract).

11. **Claims 5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bosch et al. (US 6506254 B1) in view of Wang et al. (US 2003/0188685 A1) as applied to claim 1 above, and further in view of Zhao et al. (US 5885356).** Bosch and Wang are discussed above.

Bosch and Wang do not teach:

i. A reactor according to claim 1, characterized in that the heater liner is fastened to the leakproof wall of the reaction chamber by a small number of fastening points – **as claimed in claim 5.**

ii. A reactor according to claim 5, characterized in that the fastening points are of thermally insulating structure opposing the transfer of heat energy by conduction from the heater liner to the leakproof wall of the reaction chamber – **as claimed in claim 7**.

Zhao teaches a substrate processing apparatus comprising:

i. A liner (44) is fastened to the leakproof wall (230) of a chamber (239) by a small number of fastening points (screw, 41) (Figs. 4 and 5, Col. 7, lines 28-31) – **in claim 5.**

ii. The fastening points (screw, 41) are of thermally insulating structure (TEFLON) (Col. 7, lines 15-31) – **in claim 7.**

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Zhao's TEFLON screws as fastening points to Bosch's apparatus.

Motivation to add Zhao's TEFLON screws as fastening points to Bosch's apparatus is that the TEFLON is not only insulating, but the surface of the TEFLON is less susceptible to particulate formation as taught by Zhao (Col.3, lines 51-57)

12. **Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bosch et al. (US 6506254 B1) in view of Wang et al. (US 2003/0188685 A1) and Zhao et al. (US 5885356) as applied to claim 5 above, and further in view of Freiberger et al. (US 3880396).** Bosch, Wang and Zhao are discussed above.

Bosch further teaches that the liner (20) can be supported in any suitable way (Col. 10, lines 28-29).

Bosch, Wang and Zhao do not teach:

i. A reactor according to claim 5, characterized in that the heater liner (14) is suspended from the leakproof wall (2) of the reaction chamber (1) by three projections having heads, projecting beneath the face of the leakproof wall (2) and engaged in keyhole-shaped slots each having a wide portion and for passing a head and a narrow portion for retaining the head – **as claimed in claim 8.**

Freiberger teaches a quick change panel fastening system comprising:

i. Projections (23) having heads (23b), projecting beneath the face of the base structure (11) and engaged in keyhole-shaped slots (60) in a panel (10), each slot having a wide portion (60a) and for passing a head (23b) and a narrow portion (60b) for retaining the head (23b) (See Figs. 1, 4, 5; Col. 1, line 66 thru Col. 2, line 20; and Col. 3, line 53 thru Col. 4, line 21) – **in claim 8.**

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use Freiberger's fastening components on Bosch's support bracket (26).

Motivation to use Freiberger's fastening components on Bosch's support bracket is to provide a simplified structure for quickly and easily mounting a panel on a base as taught by Freiberger (Col. 1, lines 18-20). Further, it is well established that the duplication of parts is obvious (In re Harza , 274 F.2d 669, 124 USPQ 378 (CCPA 1960) MPEP 2144.04).

13. **Claims 10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bosch et al. (US 6506254 B1) in view of Wang et al. (US 2003/0188685 A1) as applied to**

claims 9 and 1 above, and further in view of Zhao et al. (US 5968379). Bosch and Wang are discussed above.

Bosch and Wang do not teach:

i. The electrical resistances comprise thin-film electrical resistances and/or electrical resistances of the thermnocoaxial type – **claim 10.**

ii. A reactor according to claim 1, characterized in that the heater liner includes heater means (see above) suitable for heating it to a temperature higher than 150 degree C – **as claimed in claim 13.**

Zhao teaches a wafer processing apparatus comprising:

i. A heating element (107) of electrical resistances comprises thin-film (flat ribbon) electrical resistances capable of heating to 400 degree C (See Fig. 7C, Col. 7, lines 19-21; Col. 18, lines 49-55; Col. 20, lines 25-41) - **claims 10 and 13.**

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Bosch's heater with Zhao's flat ribbon heating element.

Motivaton to replace Bosch's heater with Zhao's flat ribbon heating element is that Zhao's flat heating element provides a greater ratio of surface area to cross-section area, which transfers heat more effectively as taught by Zhao (Col. 20, lines 52-56).

14. Claims 10 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bosch et al. (US 6506254 B1) in view of Wang et al. (US 2003/0188685 A1) as applied to claims 9 and 1 above, and further in view of Sopory (US 6492629 B1). Bosch and Wang are discussed above.

Bosch and Wang do not teach:

i. The electrical resistances comprise thin-film electrical resistances and/or electrical resistances of the thermnocoaxial type – **claim 10**.

ii. A reactor according to claim 1, characterized in that the heater liner includes heater means (see above) suitable for heating it to a temperature higher than 150 degrees C – **as claimed in claim 13**.

Sopory teaches an electrical heating device comprising:

i. A flexible coaxial heater cable (100) that can maintain a temperature range of 500-600 degrees F(Fig. 6, Col. 7, line 18 to 38; Col. 10, lines 44-47) – **claims 10 and 13**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Bosch's heater with Sopory's coaxial heater cable.

Motivation to replace Bosch's heater with Sopory's coaxial heater cable is that Sopory's coaxial heater cable responds very rapidly to achieve an equilibrium state as taught by Sopory (Col. 7, lines 27-29).

15. **Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bosch et al. (US 6506254 B1) in view of Wang et al. (US 2003/0188685 A1) as applied to claim 1 above, and further in view of Collins et al. (US 6063233)**. Bosch and Wang are discussed above.

Bosch further teaches:

i. The heater liner (20) is heated by radiant (Col. 10, lines 38-40) heater means (see above) **– in claim 11**.

Bosch and Wang do not teach:

i. A reactor according to claim 1, characterized in that the heater liner is heated by radiant heater means such as infrared elements – **as claimed in claim 11**.

Collins teaches a plasma processing apparatus comprising:

i. Radiant heater means (see above) such as infrared elements (tungsten/halogen lamps, 72) (Fig. 4A, Col. 18, lines 17-35) – **in claim 11**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Collins' lamps to Bosch's apparatus.

Motivation to add Collins' lamps to Bosch's apparatus is because this type of radiant heater has minimal thermal lag, that is, response time to temperature setting change is very short (less than one second) as taught by Collins (Col. 18, lines 17-35).

16. **Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bosch et al. (US 6506254 B1) in view of Wang et al. (US 2003/0188685 A1) as applied to claim 1 above, and further in view of Kuo (US 4871012).** Bosch and Wang are discussed above.

Bosch and Wang do not teach:

i. A reactor according to claim 1, characterized in that the inside surface of the heater liner is structured so as to present a low radiation emission coefficient – **as claimed in claim 14.**

Kuo teaches a variable conductance thermal insulation blanket comprising:

i. A radiation shield (24) of low emittance[1] so that little heat will be reradiated to adjacent components, the shield (24) is made of polished aluminum (Fig. 2, Col. 2, line 64 to Col. 3, line 7) – **claim 14**.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a polished finish to the inside surface of Wang's aluminum liner.

Motivation to provide a polished finish to the inside surface of Wang's aluminum liner is to minimize the radiation of heat to adjacent components as taught by Kuo (Col. 2, line 64 to Col. 3, line 7).

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Kim et al. (US 6096161) – Heat resistant TEFLON screws.

Bisschops (US 6630984 B2) – Emission-inhibiting surface finish.

Matlow (US 5328556) – Carbon monoxide for etching.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner James Ng whose telephone number is (571) 272-7088. The examiner can normally be reached on a Monday through Thursday schedule from 9am through 4:30pm. The official fax phone number for the 1763 art unit is (571) 273-8300. Any

Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner cannot be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

James Ng
Patent Examiner
Art Unit 1763

Rudy Zervigon
Primary Patent Examiner
Art Unit 1763

3/30/7

[1] http://www.matweb.com/search/SpecificMaterial.asp?bassnum=AMEAl00